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EVALUATION OF THE GENERALIZED EFFECTS OF A PEER-TRAINING PROCEDURE WITH MODERATELY RETARDED ADOLESCENTS

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The use of peer-training procedures by moderately mentally retarded adolescents was evaluated in two experiments. In Experiment 1, 2 students received instruction on peer-training skills to teach a vocational task to 7 classmates. Following instruction, both peer trainers were successful in teaching their classmates to perform the target task and a second untrained (generalization) task. In Experiment 2, 1 peer trainer taught 3 peers to use picture prompts to complete one or two complex vocational tasks. Following instruction by the peer trainer, the trainees independently used novel pictures on novel tasks. The results of both experiments indicate that peer training with moderately handicapped students can be an effective instructional procedure, with generalization occurring for both the trainers (Experiment 1) and the trainees (Experiment 2).

DESCRIPTORS: peer training, generalization, moderate mental retardation

In most peer-training studies, nonhandicapped or less handicapped peers have been used as behavior-change agents for their more handicapped classmates (Fowler, Dougherty, Kirby, & Kohler, 1986; McKinney & Keele, 1963; Odom, Hoyson, Jamieson, & Strain, 1985; Sasso & Rude, 1987; Wagner & Sternlicht, 1975). The results of more recent investigations have suggested that persons with moderate mental retardation can also train each other on at least some tasks (Martin, Cornick, Hughes, Mullen, & Ducharme, 1984; Wacker & Berg, 1984, 1985). However, the extent to which peer instruction can be used to augment staff instruction in school programs is unknown (Greenwood, Carta, & Hall, 1988). If peer instruction is to be used efficiently as part of ongoing school programs, the peer-training skills of students should generalize across tasks, at least for tasks that are similar to the original training task; otherwise, staff would have to train clients repeatedly in peer-training skills, substantially reducing any cost benefits associated with the procedures. Previous investigations have indicated that peer-training procedures may facilitate generalized teaching among students across settings (Kohler & Greenwood, 1986), but few investigations have assessed generalization of peer-teaching skills across tasks with handicapped trainers or the effectiveness of peer training in producing generalized skills in the trainees. In a study by Wacker and Berg (1984), 3 severely retarded adolescents who were taught a photocopying task by a moderately retarded peer trainer subsequently performed a second photocopying task, but the untrained task was essentially a different version of the original task in the same setting.

We evaluated generalization for both the peer trainer and the trainees in two separate experiments with moderately mentally retarded adolescents in public school settings. In Experiment 1, generalization of peer-training skills was evaluated across tasks. In Experiment 2, 1 peer trainer instructed 3 peers to use pictures to guide their performance on complex tasks (e.g., loading a soft drink machine). Following training, the trainees' continued use of pictures on an untrained task was assessed to de-

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termine whether generalized use of the pictures occurred. Picture prompts were selected because of previous demonstrations (e.g., Wacker, Berg, Berrie, & Swatta, 1985) of the effectiveness of pictures in producing generalization across tasks for students with moderate and severe mental retardation.

EXPERIMENT 1: GENERALIZED USE OF PEER-TRAINING SKILLS

Method

Subjects

All 9 students from a self-contained classroom for moderately mentally retarded students located in a regular public school building participated in the investigation. None of these students had previous experience with peer-training techniques or with the target tasks. The students ranged in age from 12 to 14 years.

Carl and Mary were selected as the peer trainers by their classroom teacher because of their competence in completing classroom tasks and their effective communication skills. Carl had a measured IQ of 45. Mary had a measured IQ of 50 and a severe hearing loss. She wore a hearing aid throughout the investigation.

The trainees for each trainer were assigned by the classroom teacher and were grouped according to their general skills in the classroom. Dick, Terri, and John were the trainees for Carl. The measured IQs of these students were 40, 32, and 32, respectively. All 3 trainees responded to simple oral instructions, but Terri and John had limited speech. Terri and John were generally cooperative and demonstrated few behavior problems. Dick, however, demonstrated frequent classroom behavior problems, often refusing to complete assigned tasks. Susan, Galen, Larry, and Lisa were the trainees for Mary, and had measured IQs of 50, 45, 50, and 45, respectively. These trainees spoke in simple sentences, and the teacher reported that they learned to complete tasks at a faster rate than the trainees in Carl's group. However, these students also displayed more frequent but mild behavior problems, such as engaging in arguments with other students or refusing to complete assigned tasks.

Setting and Tasks

The experiment was conducted in an empty classroom and in a quiet hallway next to the classroom. The trainer and 1 trainee worked at a large table. Previously untrained tasks were selected for each student from his or her individualized education program based on teacher recommendations. The training task for Carl's group consisted of two similar versions of a packaging task (task analyses are available from the first author). The task consisted of placing rubber washers of varying sizes into plastic bags. The only difference between the two versions of this task was the number of washers to be placed into each bag. The students' task was to complete 10 bags of washers. Completion of each bag required 19 or 14 steps (190 and 140 total steps, respectively). The generalization task consisted of a 15-step valve assembly. Each student was required to assemble four valves.

The training task for Mary's group included two similar versions of a filing task. The students were required to place 10 index cards into a metal file by the first two letters of a word written on each card. The two versions consisted of different words. Approximately three steps were required to file each card.

The generalization task used with Susan and Galen consisted of the same packaging task used with the first group. The generalization task for Larry and Lisa consisted of two versions of a measuring task, in which the students deposited different quantities of baking items (e.g., flour) into a bowl by following a recipe card. Both versions consisted of 16 steps and were differentiated by the items and quantities listed.

Target Behavior and Reliability

Trainees. The trainee's behavior was scored as correct or incorrect for each step of the task analysis on all tasks. During reliability sessions, two of the experimenters, or one experimenter and an undergraduate student, simultaneously but independently scored the student's task performance. An agreement occurred when both observers scored the same step of the task analysis as correct or incorrect. Interrater agreement was computed by dividing

agreements by agreements plus disagreements and multiplying by 100.

Interrater agreement was conducted as least three times for each trainee on each task and across all conditions (baseline, training, posttraining, and generalization) of the experiment. Interrater agreement was conducted during 61% of the sessions for Carl's group and during 48% of the sessions for Mary's group. Average agreement was 98.9% and ranged from 84.3% to 100% across students and conditions.

Trainers. During the training condition, interrater agreement was also conducted nine times for Carl and 23 times for Mary on their use of the following peer-training techniques: (a) prompts, (b) correction, and (c) praise. Prompts occurred before the trainee had completed a step and were scored as either appropriate or unneeded. An appropriate prompt was scored if the trainee began a step incorrectly or in the wrong sequence, and the trainer stopped the response and indicated (modeled, pointed to, said) the correct response. Incorrect prompts were scored if the trainer issued a prompt when the trainee was completing the step correctly, or (more frequently) if the trainee was not given enough time to respond before the prompt was presented. Prompts, although not trained or used during practice of peer training with the experimenters, were measured because of their spontaneous occurrence during peer-teaching sessions. The trainers may not have used prompts during practice sessions with staff because the staff responded more quickly on the task than did the trainees.

Corrections were scored as appropriate, missed, or inappropriate, and occurred once a step had been completed by a trainee. An appropriate correction occurred following an incorrect response if the trainer stopped the trainee and indicated (e.g., modeled, pointed to, etc.) the correct response. A missed correction was scored if the trainee performed a step incorrectly but was not corrected by the trainer. Inappropriate correction occurred when the trainer "corrected" an appropriate response.

Appropriate praise occurred when the trainee completed a step correctly, and the trainer verbally (saying "good") or physically (shaking hands) rewarded the trainee. Inappropriate praise occurred when the trainer praised the trainee following an incorrect response. Missed praise was not scored, as praise was not expected to be delivered on a continuous reinforcement schedule.

Average agreement for Carl was 99.6% and ranged from 98% to 100%. Average agreement for Mary was 99.2% and ranged from 93.3% to 100%.

Design

Data were collected within a combination multiple baseline design across subjects (trainees within each group) and a multiple probe design across tasks (training and generalization tasks). Three conditions were used for the training tasks: baseline, training, and posttraining. The generalization tasks consisted of two conditions: baseline and training. Training on the generalization tasks was conducted simultaneously with posttraining on the training task.

Procedure

Instruction of the peer trainers. Carl and Mary were trained to complete both the training and the generalization tasks by the experimenters. The experimenters used the same procedures the peer trainers were to use: (a) one demonstration of correct performance, (b) contingent correction (verbal or gestural), and (c) contingent verbal praise. Carl and Mary learned the tasks (100% accuracy) within four and five sessions, respectively (approximately 20 min per session).

Following this brief training, they were told that they were now going to show some of their peers how to complete the tasks ("be the teacher"). The trainers were told to imitate the experimenters in providing a demonstration and correction or praise. The trainers then practiced these skills by individually instructing at least two adults (the experimenters and an undergraduate student). While the trainers were practicing their skills, an experimenter corrected their mistakes and/or praised their performance. All instruction of the peer-training techniques was conducted on the training task and was

completed within three sessions (60 min) for each trainer.

Baseline (training tasks). Baseline sessions were conducted by the experimenters. Prior to each session (one attempt to complete a task), the trainee was provided with one demonstration of correct performance and, for the packaging and assembly tasks, a sample of a completed item. Following the demonstration, the trainees were told to "do the same." No correction or contingent praise was provided. Credit was given for any step completed correctly, regardless of the sequence used by the trainee. For tasks that contained alternate versions, baseline was conducted on each task in a counterbalanced order.

A demonstration was given prior to every session because this is a common procedure in classroom settings. In addition, providing the demonstration ensured that the tasks were of sufficient difficulty that the trainers would need to use the peer-training techniques.

Baseline probes (generalization tasks). Baseline probes were conducted intermittently on the generalization tasks throughout baseline and training on the training task. Probes were conducted two to four times per week, with a minimum of six probes for each student. Baseline probes were conducted with the same procedures used during baseline on the training task.

Training (training tasks). All training was conducted individually by the peer trainers, with the experimenters sitting to one side. The trainees were told that the peer trainer (Carl or Mary) was going to teach them some new tasks. The trainer demonstrated the correct responses, and then prompted, corrected, or praised the trainee's performance. For tasks that contained alternate versions, training was conducted in a counterbalanced order across sessions. A session constituted one attempt by the trainee to complete the task.

The experimenters provided no instruction to either the trainer or the trainee during a session. They ignored any remarks or gestures made by the students unless a student exhibited behavior problems. The most common behavior problems were teasing and refusing to work. Because the peer trainers were not trained to modify behavior problems, the experimenters intervened by either terminating a session (once) or briefly instructing the student to "work."

The peer trainers were given feedback after the completion of training sessions when the trainees had left the room. In most cases, they were told to praise more often and were praised for their performance. Beginning with the 10th training session (cumulative across trainees), the trainers were also provided with a soft drink after every fourth or fifth training session if no interventions by the experimenters were needed for the trainer's behavior during the preceding session. Training continued until a trainee completed at least 80% of the steps correctly for two consecutive sessions and did not make the same error on consecutive sessions.

Posttraining and generalization. The peer trainers were not present during posttraining. All posttraining sessions were conducted by the experimenters using the same procedures as during baseline except that the demonstration was discontinued. Instead, the trainees were told to show the experimenter what they had learned. No praise or correction was provided.

During assessments of generalization on the untrained tasks, the peer trainers again instructed the students. However, the peer trainers had not been taught by the experimenters to train this task and were not prompted to use their skills. No intervention by the experimenters was provided during a session, and no feedback was given to the peer trainers following a session.

Results and Discussion

The results for the trainees in Carl's group are shown in Figure 1. During baseline, the trainees performed both the training and the generalization tasks with less than 55% accuracy. No improvement occurred in their performance across sessions, even though they were provided with a demonstration of correct performance prior to each session. Each trainee demonstrated immediate and substantial improvement in performance during the first training session, with John and Dick completing over 90% of the steps correctly. Training

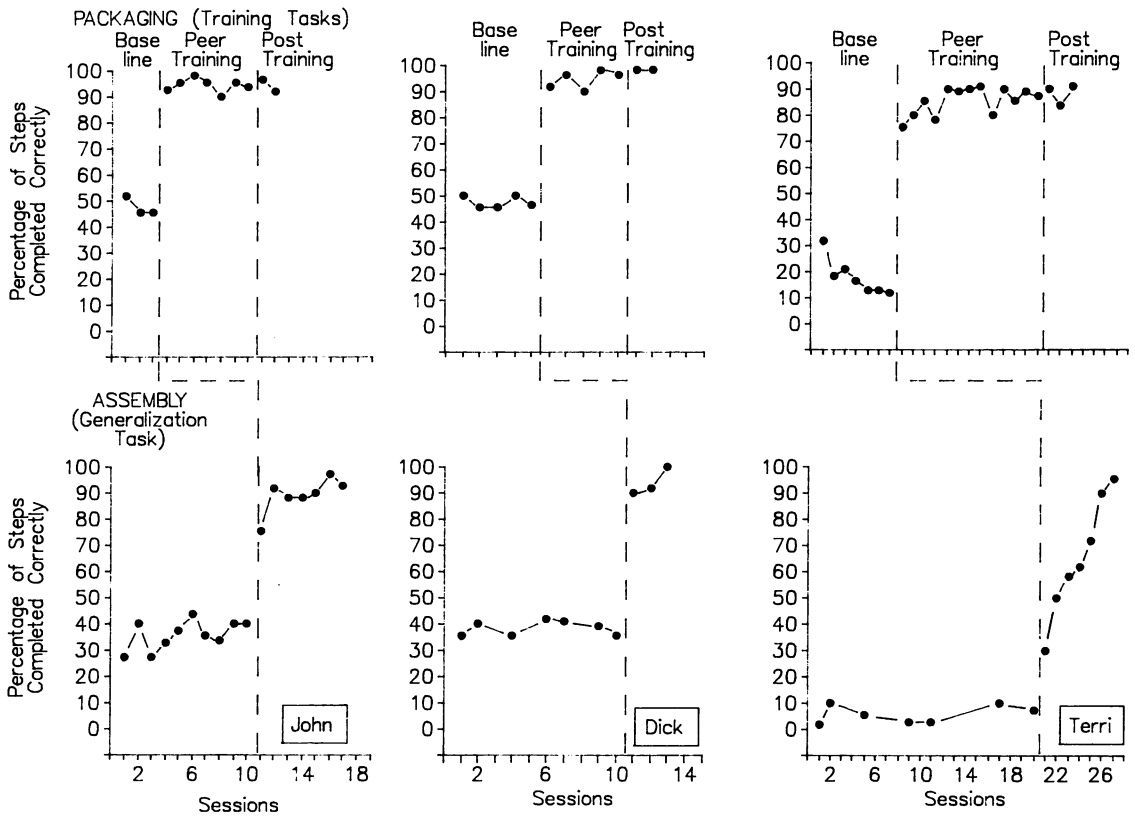

Figure 1. Trainees' performance on the training and generalization tasks when trained by Carl.

was subsequently completed for these 2 students in four and seven sessions, respectively. Each session lasted for 15 to 30 min. Terri completed 90% of the steps correctly on the fifth session, but she required 13 training sessions to reach criterion (she continued to make the same errors across training sessions). On only one session (Training Session 3 for Dick) did a behavior problem occur. During posttraining, all 3 trainees continued to perform the training task with at least 90% accuracy in the absence of praise or correction.

Similar patterns of performance occurred for the trainees on the generalization task. Both Dick and John demonstrated substantial improvement during the first training session, accurately completing over 90% and 70% of the steps, respectively. Training was completed in three sessions for Dick and in seven sessions for John. Terri demonstrated steady improvement, increasing her accuracy of performance by approximately 20% during the first training session and completing training in seven sessions.

The performances of the trainees in Mary's group are presented in Figure 2. These students required greater amounts of training on the training task, ranging from nine sessions for Larry to 20 sessions for Galen. Each student demonstrated steady improvement across training sessions, with Larry demonstrating the most immediate improvement.

Behavior problems occurred more often with Mary's trainees than with Carl's trainees. Staff intervention was required during at least two sessions for all trainees except Larry and were most frequent for Susan. The difficulty occurred because of the behavior of the peer trainer (Mary), who teased the trainees or attempted to speed up their performance.

All of the trainees continued to perform the task with at least 90% accuracy during posttraining. On the generalization task, Galen, Susan, and Lisa

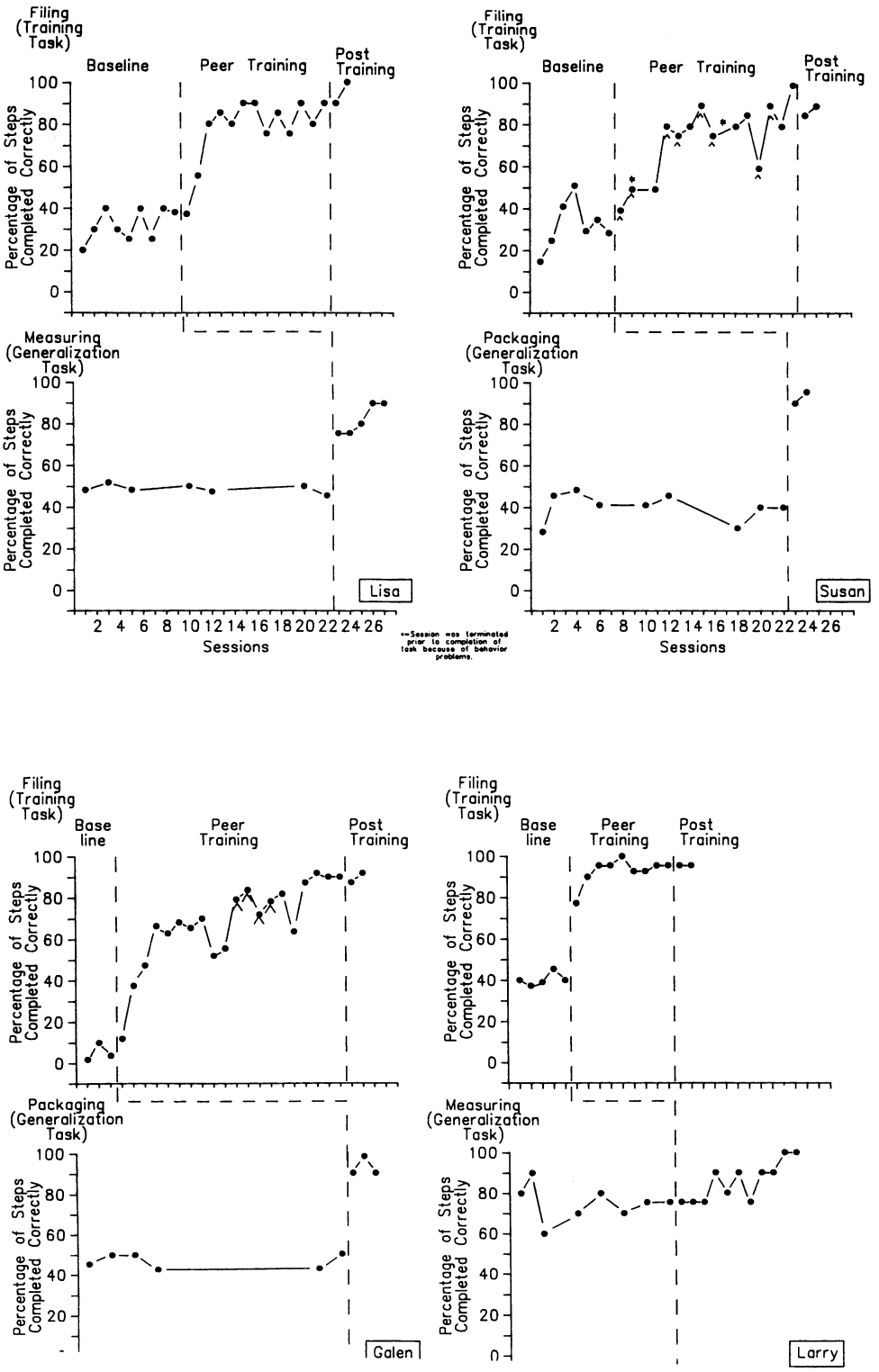

Figure 2. Trainees' performance on the training and generalization tasks when trained by Mary.

Table 1
Frequency of Use of Peer-Training Techniques by the Peer Trainers

Trainer/tasks	Prompts		Correction			Praise	
	Appropriate	Unneeded	Appropriate	Missed	Inappropriate	Appropriate	Inappropriate
Carl (Exp. 1)							
Training (24 sessions)	37	31	204	14	3	430	3
Generalization (17 sessions)	11	19	141	9	0	108	0
Mary (Exp. 1)							
Training (56 sessions)	27	149	191	20	7	383	1
Generalization (17 sessions)	5	10	27	13	6	68	2
Jenny (Exp. 2)							
Training	143	322	295	169	11	206	2

demonstrated substantial improvement during the first training session and completed training very quickly (in three, two, and five sessions, respectively). Larry, who was completing the task with over 80% accuracy during baseline, required 11 sessions to reach criterion. This length of training occurred because he continued to make the same errors across sessions, and Mary failed to correct some of these errors during the first three sessions of training.

The total number of prompts, correction, and praise provided by the peer trainers is presented in Table 1. Both peer trainers always gave one demonstration of the correct response at the beginning of each session; these data are not included with other prompts in the table. Carl and Mary were much more effective in using consequence procedures (correction and praise) than in using prompts (which were never taught). Carl's use of correction and praise was appropriate on over 90% of the occasions on both the training and the generalization tasks.

Mary's use of correction was appropriate on 87.6% of the occasions, and she used praise appropriately on 99.7% of the occasions on the training task. Unlike Carl, she also used a large number of prompts, 72.3% of which were unneeded. Most of these unneeded prompts were used in an attempt to speed up the performance of the trainees.

Mary performed similarly on the generalization task with respect to her use of praise and prompts. She delivered praise appropriately on 97.1% of the occasions and continued to deliver unneeded prompts (66%), although much less frequently (149 vs. 10 times). She also demonstrated a decrease in her use of appropriate correction (58.7%).

The results of Experiment 1 replicate the results of two previous investigations (Wacker & Berg, 1984, 1985) and demonstrate that 2 moderately handicapped students could successfully train their classmates on vocational tasks. In both of these investigations and in the present experiment, the peer trainers relied primarily on demonstrations and correction (the training technique taught to them) to modify behavior. However, behavior of the trainers was variable, even in their use of the praise and correction procedures. This finding is similar to the results of Johnson and Bailey (1974), who evaluated the accuracy of training procedures used by fifth-grade peer tutors.

The present results suggest that the peer trainers' skills generalized across similar tasks, although baseline data were not collected on the use of these techniques with the untrained tasks. The trainees' performance did not improve during baseline, even with a demonstration provided prior to each session. These results indicate that training was needed by the trainees and that they received the needed instruction from the trainers.

Although Mary's behavior was intermittently

problematic, she was also successful in training her peers. Mary's behavior difficulties suggest that the selection of peer trainers might be based more appropriately on their social behavior than on their skills in completing tasks. However, even with the problems encountered with Mary, very minimal intervention from the experimenters was needed, except occasionally to tell the students to return to work. It would have been quite possible, for example, for the experimenters or the teacher to have provided this level of intervention while still instructing other students on other tasks.

Experiment 2 was conducted to focus more on the behavior of trainees; specifically, it focused on generalization of their skills following peer training. Of particular interest was whether students trained to use a picture prompt strategy would generalize their performance across tasks. A secondary purpose was to extend previous findings with peer instruction to include tasks that were more complex than those used in previous studies. Finally, given the high frequency of unneeded prompts, data on the trainees' performance were plotted to show only those steps for which independent responses were possible. When unneeded prompts were delivered by the trainer, that step was deleted from further analysis of the trainee's behavior for that session.

EXPERIMENT 2: GENERALIZATION OF TRAINEE PERFORMANCE ACROSS COMPLEX TASKS

Method

Subjects, Tasks, and Setting

Four students from a school program for young adolescents participated in Experiment 2. The students ranged in age from 13 to 14 years, and all were labeled as moderately mentally retarded, with IQ scores between 40 and 50. Jenny was selected as the peer trainer by her classroom teacher because of her skills on other classroom activities and her social behavior. Roy, Greg, and Kathy were the trainees. Roy had a severe hearing loss, and Greg was diagnosed as autistic; in addition, their speech was difficult to understand. Kathy had good verbal skills (spoke in simple sentences) and had no sensory impairments. None of the students had experience with peer training or with picture prompts.

The training and generalization tasks were selected based on the recommendations of the classroom teacher. Each task was performed daily by the custodian at the school, who agreed to permit the students to complete the tasks for the duration of the experiment. The first training task for all trainees was to load a soft drink machine in the teachers' lounge. The task consisted of 56 steps that included opening the machine, checking all rows of soft drink bottles, filling rows with the correct containers as needed, emptying bottle lids, and closing and locking the machine. Soft drinks were stored in a separate room (custodian's closet), requiring the students to travel back and forth between rooms. Eighteen pictures, depicting the task steps, were bound into a picture book. This task required 74 separate steps, including turning the pictures in the book.

The second training task for Greg was to clean the toilet bowl in the boys' bathroom located next to the classroom. This task consisted of 34 task steps and 33 pictures for a total of 67 steps. Greg was required to get the picture book independently, obtain the cleaning bucket with cleaning supplies, take the supplies to the bathroom, and clean the toilet. He was also required to measure the correct amount of cleaner with a measuring cup and clean the toilet brush after it was used.

The second training task for Roy was to clean the mirror and empty the trash in the same boys' bathroom. This task consisted of 22 task steps and 18 pictures for a total of 40 steps.

The generalization task for both Greg and Roy was to clean the sink in the same bathroom; this task consisted of 32 steps and 27 pictures for a total of 59 steps. Kathy only loaded the soft drink machine, because she was able to complete all of the cleaning tasks during baseline.

Target Behavior and Reliability

The steps for each task were listed in separate task analyses that contained steps for turning the pages as well as for completing the task. Each step

was scored as correct (if the trainee completed the step without assistance) or incorrect. During reliability sessions, one experimenter, together with another experimenter or a classroom teacher, independently but simultaneously scored each step of the task analysis. An agreement occurred if both observers scored the same step as correct or incorrect. Interrater agreement was computed by dividing agreements by agreements plus disagreements and multiplying by 100. Reliability sessions were conducted on 29.2% of all sessions. At least one reliability session was conducted for each student during each condition (baseline, training, posttraining, maintenance, and generalization). Average reliability was 96.3% and ranged from 82.7% to 100%.

During training, reliability also was conducted on the peer trainer's use of prompts, correction, and praise (using the same definitions as described for Experiment 1). Reliability was conducted on 23.4% of the total sessions, with average reliability being 95.8% (range, 89.3% to 99.2%) across all behaviors.

Design and Procedures

A multiple baseline design across both students (within each task) and tasks (between training and generalization tasks) was used to evaluate the results. The students participated in five conditions: baseline, training, posttraining, generalization, and maintenance. These conditions were preceded by instruction of the peer trainer.

Initially, the experimenters and the classroom teacher taught Jenny the training and generalization tasks without the picture prompts. The same training procedures she was to use with her peers were used during instruction (e.g., one demonstration, contingent praise, etc.). Jenny was then told that her peers would be using the pictures, and she was shown how to use them. She practiced using the pictures while completing the tasks and also practiced training the experimenters to use the pictures to complete the tasks. The peer trainer completed instruction on all training tasks in approximately 3 weeks, with instruction provided two to four times per week for approximately 30 min per day.

Baseline. Baseline with the trainees was conducted by the experimenters or the classroom teacher and was completed while the trainer was receiving instruction. Each baseline session constituted one attempt to complete a task and was preceded by a verbal description of the task. The students were not provided with pictures or with correction or praise. Any task step completed correctly, regardless of the sequence, was scored as correct. Number of baseline sessions ranged from 3 to 10 across tasks to form a multiple baseline. One baseline session per task was completed daily, two to four times per week.

Training. Training was conducted entirely by the peer trainer, except for one step for Greg on the soft drink machine task. Greg had great difficulty learning how to turn the key in the soft drink machine, even though the peer trainer consistently demonstrated correct behavior and corrected Greg's mistakes. After 12 training sessions, his teacher used massed practice to teach Greg this behavior.

Each trainee received training on loading the soft drink machine and on one of the bathroom cleaning tasks. The trainees were told on the first session that Jenny was going to teach them to complete the tasks, but no other instructions were provided to the trainees by the experimenters.

During each training session, Jenny told the trainee to get his or her book, and she then directed the trainee to do the task. Jenny modeled looking at the pictures and doing the response depicted, training the students to use a look-then-do sequence. She was required to correct performance as needed and to provide praise contingently. At the completion of a session, Jenny received feedback on her performance.

Each step of the task analysis was scored as correct or incorrect. To be correct, the student needed to complete the step independently with no prompting or correction from Jenny. If an unnecessary prompt was given, that step was deleted from the analysis for that session.

Training sessions were conducted once per day on each task, two or three times per week. Training continued until the trainee completed at least 90%

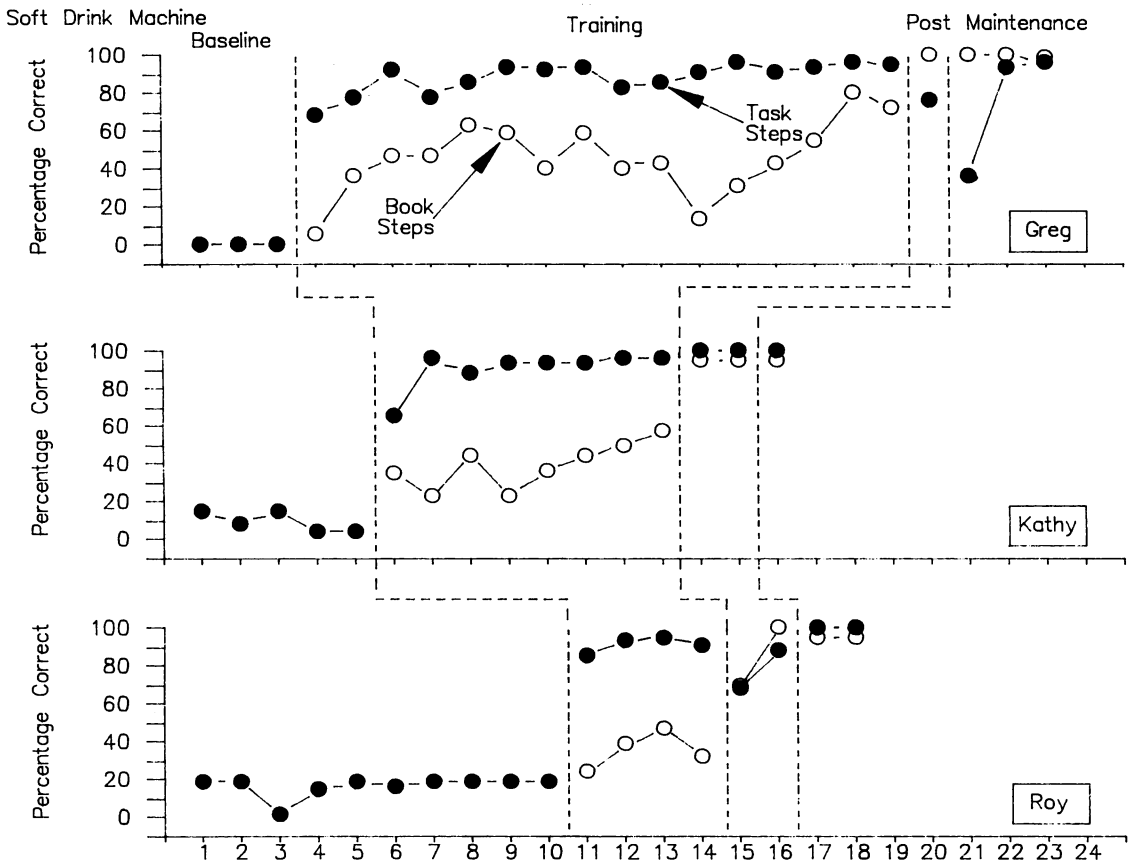

Figure 3. Trainees' performance on the soft drink machine task.

of the steps for the soft drink loading task and at least 85% of the steps for the cleaning task independently (without prompting) on two consecutive sessions each. In addition, training continued if the trainee made the same error during two consecutive sessions. No criteria were established for using the pictures, although Jenny prompted the trainees to use the pictures and praised or corrected their use of the pictures.

Posttraining. The trainees were permitted to use the pictures but were not told to use them. Instead, they were told by the experimenters or the classroom teacher to complete the task. The peer trainer no longer was available to the trainees, and no prompting, correction, or praise was provided. Posttraining was conducted to determine the students' independence in completing the training tasks and their continued use of the pictures.

Generalization. Generalization was conducted at the same time as posttraining for Greg and Roy. The procedures were the same as for posttraining. Greg and Roy were told to complete their assigned tasks, and the pictures depicting how to complete the tasks were provided. During the first generalization session, Greg and Roy were shown the pictures but were not required to use them.

Maintenance. Maintenance sessions were conducted only on the training tasks and began approximately 3 weeks after posttraining. During the interval between posttraining and maintenance, the students did not use the pictures or complete the tasks. The procedures were the same as for posttraining.

Results and Discussion

The performance of the students on the soft drink machine task is illustrated in Figure 3. During baseline, none of the students completed more than

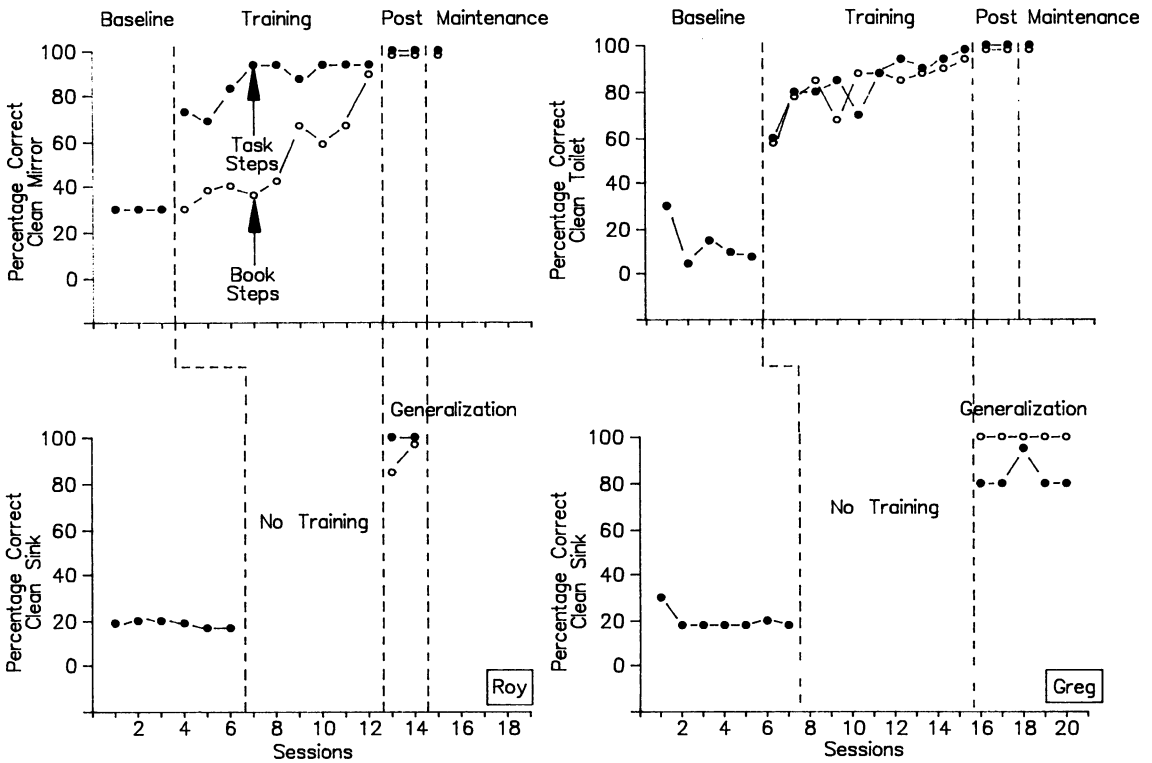

Figure 4. Performance of Roy and Greg on the bathroom cleaning tasks.

20% of the task steps correctly, and none showed improvement across sessions. During training, each student demonstrated immediate, substantial improvement on the task steps, but variable performance on the book steps.

Training was completed in 16 sessions for Greg, eight sessions for Kathy, and four sessions for Roy. During posttraining, both Greg and Kathy turned all pages independently. Kathy performed errorlessly, and Greg completed the task with over 75% accuracy. Roy did not consistently use his book on the first posttraining session, and his performance decreased substantially. On the second session, he turned all pages, and his performance improved. Of interest is that the students self-corrected their performance repeatedly. They frequently began to complete a step without using the pictures, stopped, turned the page, and then finished the step.

Kathy and Roy completed the task errorlessly during maintenance. Greg, however, had substantial difficulty during the first maintenance session. After getting the picture book, he turned all pages without attempting the task and then appeared to complete task steps randomly. During the second and third sessions, he completed the correct task step after turning a page, and his performance improved.

The performance of Roy and Greg on the bathroom cleaning tasks is presented in Figure 4. On the training task, Roy performed with less than 35% accuracy across sessions during baseline. Immediate improvement occurred with training on the task steps, with more gradual but steady improvement on the book steps. Performance on the book steps was low relative to the task steps because Roy, and the other trainees, frequently attempted to complete the next step of the task analysis before turning the page in the book, and were at that point usually corrected. He completed training in nine sessions, after which he performed errorlessly during posttraining and maintenance. Roy's performance also generalized to a novel task (cleaning sink), and he again performed errorlessly during the second generalization probe. Of special impor-

tance is that he generalized his use of pictures on a novel task.

Similar results occurred for Greg. After making no improvement during baseline on either task, Greg immediately improved his performance with training, after which he performed nearly errorlessly during posttraining and maintenance. On the generalization task, he used the pictures and completed the task steps with at least 80% accuracy.

The performance of the peer trainer is illustrated in Table 1. As was the case for the peer trainers in Experiment 1, Jenny's use of praise was almost always correct. Jenny missed a large number of corrections, but in general was much more effective using correction than using prompts. Most of the unnecessary prompts were for the trainees to use their pictures.

As in Experiment l, the trainees all rapidly learned to complete the target tasks when trained by the peer trainer. On only one step for 1 student was instruction provided by the teacher. Following training, the students continued to perform the tasks correctly, maintained their skills for approximately 3 weeks, and used novel pictures to complete the generalization tasks.

These results extend the results of Experiment 1 in three ways. First, the tasks trained were more complex than those used in Experiment 1. Second, the trainees were taught to use a picture prompt system as well as to complete the task, making training more complex. Third, the students used novel pictures across untrained tasks, suggesting that generalization had occurred. This finding is noteworthy in that the generalization achieved is comparable to other students trained with pictures by the experimenters (e.g., Wacker et al., 1985).

GENERAL DISCUSSION

The efficacy of peer training with moderately mentally retarded adolescents was supported by the results of both experiments. A total of 10 trainees learned to complete vocational tasks with very minimal instruction from educational staff or the experimenters. They were taught by peers who modeled correct performance and then corrected or praised the trainees' attempts to follow the model. Each of the trainers was effective in instructing the students, although Mary demonstrated behavior problems. The trainers in Experiment 1 appeared to generalize their use of the peer-training strategies across tasks, and the trainees in Experiment 2 appeared to generalize their skills across tasks. However, these results must be interpreted with caution, because baseline measures were not obtained on the students' use of the training techniques or their use of pictures.

Greenwood et al. (1988) reported that, although extensive research has been conducted on peer tutoring, only minimal research has been conducted to determine how to train students with disabilities to function as tutors. Craighead and Mercatoris (1973) also concluded that the potential utility of mentally retarded persons as trainers is limited because their ability as trainers has not been evaluated. The present results replicate previous studies in demonstrating that peer training with moderately handicapped trainers can be effective and indicate that peer training might be a viable option on even relatively complex tasks.

To further establish peer training as a viable training procedure, a more systematic analysis of the cost efficiency of peer-training procedures is needed. For example, an analysis of the time required for instruction of trainers, for ongoing supervision, and for direct instruction by staff of trainees who received peer training would establish the relative efficiency of the procedures.

In both of the present experiments and in the Wacker and Berg (1984, 1985) investigations, the peer trainers tended to use a large number of unnecessary prompts. Thus, peer trainers might be specifically taught to delay their use of prompts or to discontinue prompting altogether after the demonstration has been provided. The trainers, however, were also variable in their accurate use of the training techniques, a finding also reported by Johnson and Bailey (1974) with fifth-grade peer tutors. These results indicate that the treatment integrity of peer training needs continued evaluation (Greenwood et al., 1988).

A third area that should be addressed by further

research concerns the establishment of training objectives for the trainers as well as for the trainees (cf. Dougherty, Fowler, & Paine, 1985; Fowler et al., 1986). With few exceptions (e.g., Drabman & Spitlanik, 1973), gains for trainers who are severely handicapped have not been evaluated.

A final area of future research concerns the modification of behavior problems by peer trainers (see Drabman & Spitlanik, 1973). A logical extension of the current study would be for the trainers to signal the teacher or the experimenter when a behavior problem occurs or to discontinue the session themselves. In a previous experiment, Wacker and Berg (1984) reported that the trainer spontaneously discontinued a training session when a trainee exhibited behavior problems, suggesting that such an approach can be successful.

REFERENCES

Craighead, W., & Mercatoris, M. (1973). Mentally retarded residents as paraprofessionals: A review. *American Journal of Mental Deficiency,* **78,** 339–347.

Dougherty, B., Fowler, S., & Paine, S. (1985). The use of peer monitors to reduce negative interactions during recess. *Journal of Applied Behavior Analysis,* **18,** 141–153.

Drabman, R., & Spitlanik, R. (1973). Training a retarded child as a behavioral teaching assistant. *Journal of Behavior Therapy and Experimental Psychiatry,* **4,** 269–272.

Fowler, S., Dougherty, B., Kirby, K., & Kohler, F. (1986). Role reversals: An analysis of therapeutic effects achieved with disruptive boys during their appointments as peer monitors. *Journal of Applied Behavior Analysis,* **19,** 437–444.

Greenwood, C., Carta, J., & Hall, R. V. (1988). The use of peer tutoring strategies in classroom management and educational instruction. *School Psychology Review,* **17,** 258–275.

Johnson, M., & Bailey, J. (1974). Cross-age tutoring: Fifth graders as arithmetic tutors for kindergarten children. *Journal of Applied Behavior Analysis,* **7,** 223–232.

Kohler, F., & Greenwood, C. (1986). Toward a technology of generalization: The identification of natural contingencies of reinforcement. *The Behavior Analyst,* **9,** 19–26.

Martin, G., Cornick, G., Hughes, J., Mullen, H., & Ducharme, D. (1984). Training developmentally handicapped persons as supervisors in sheltered workshops. *Applied Research in Mental Retardation,* **5,** 199–218.

McKinney, J., & Keele, T. (1963). Effects of increased mothering on the behavior of severely retarded boys. *American Journal of Mental Deficiency,* **67,** 556–562.

Odom, S., Hoyson, M., Jamieson, B., & Strain, P. (1985). Increasing handicapped preschoolers' peer social interactions: Cross-setting and component analysis. *Journal of Applied Behavior Analysis,* **18,** 3–16.

Sasso, G., & Rude, H. (1987). Unprogrammed effects of training high-status peers to interact with severely handicapped children. *Journal of Applied Behavior Analysis,* **20,** 35–44.

Wacker, D., & Berg, W. (1984). Use of peer instruction to train a complex photocopying task to moderately and severely retarded adolescents. *Analysis and Intervention in Developmental Disabilities,* **4,** 219–234.

Wacker, D., & Berg, W. (1985). Use of peers to train and monitor the performance of adolescents with severe handicaps. *Education and Training of the Mentally Retarded,* **20,** 109–122.

Wacker, D., Berg, W., Berrie, P., & Swatta, P. (1985). Generalization and maintenance of complex skills by severely handicapped adolescents following picture prompt training. *Journal of Applied Behavior Analysis,* **19,** 329–336.

Wagner, P., & Sternlicht, M. (1975). Retarded persons as "teachers": Retarded adolescents tutoring retarded children. *American Journal of Mental Deficiency,* **79,** 674–679.

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